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A GRAPHIC METHOD OF MEASURING CIVILIZATION, AND SOME OF ITS APPLICATIONS

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IN his interesting book, "Civilization and Climate" (Yale University Press, 1915), Dr. Ellsworth Huntington has essayed to map the degrees of civilization of the whole world, and the United States in particular, and to correlate these with certain rather complex climatic factors which he had ingeniously worked out. He used several different methods for measuring civilization, but relied chiefly on a sort of composite picture of the opinions of fifty correspondents of wide experience in various parts of the northern hemisphere, supplemented by his own observations in many lands, and some independent statistical data.

Each collaborator was asked to assign a sort of percentage rating in the scale of civilization to each of the principal geographical unit areas of the world (185 in number), and the results were then averaged and mapped. These individual opinions were doubtless based on general impressions of characteristics not easily weighed or measured, and the emphasis given to each characteristic naturally varied with different collaborators. One of them took the trouble to tabulate his estimates for a few countries in considerable detail, mentioning such attributes as initiative, inventiveness, ability to carry out large projects, attention paid to education, hygiene and morality, and appreciation of the beauties of nature, art, and literature.

For the United States alone (presumably because similar statistics were not available for many other countries) Dr. Huntington supplemented the opinions of his correspondents with statistics of mortality, illiteracy, school attendance, and distinguished persons,¹ and suggested the possibility of using for the same purpose criminal records, railway mileage, postal business, and manufacturing. For comparing the efficiency of whites and negroes in one of the early chapters he set forth the results of certain psychological tests of school children, earn-

¹ An interesting early contribution to this subject is an article by Hon. Henry Cabot Lodge on the distribution of ability in the United States, in the *Century* (20: 687-694) for September, 1891.

ings of workers in specified industries, and certain census data for the farms of the two races in selected groups of states, some northern and some southern.

The final results in each case agree reasonably well with each other and with what a well-informed reader perusing the book for the first time might expect, as well as with the climatic factors used. But in the discussion of the civilization maps the reader is left in doubt as to whether any or all of the fifty collaborators took into consideration the whole population of each country or only the upper strata.

One would not have to go very far afield to find communities in which the adult population is relatively homogeneous with respect to the characters that make up civilization, analogous to a prairie in which most of the mature plants are of about the same height, and others with considerable numbers of both celebrities and "undesirable citizens," a condition analogous to a forest with tall trees, lowly fungi, and various intermediate forms.² Every large city has its cultured aristocracy and its slums, and a person relying on statistics of illiteracy, pauperism and crime for measures of civilization might rate such a city lower than a thriving rural community, while one looking only at the achievements of the most prominent citizens would put the city the higher. In some of the southeastern states a century ago about half the population consisted of illiterate slaves, but the "quality folks" gave these same states a higher standing in the eyes of the world than the more newly settled middle western or north central states, with their then much more homogeneous population.

It is evident therefore that in order to get a fair measure of civilization we must eliminate personal opinions as far as possible and find one or more rational tests that can be applied to the whole population or the greater part of it; or better still, instead of merely taking averages, devise curves to show the range of variation in each community or group studied. For most such data we must look to the government census reports, but some are more readily obtainable from other sources, and some not at present available at all except for a few small groups may possibly be returned by future censuses.

The statistics that may be used as criteria of civilization might be divided roughly into two classes, namely, institutional and individual. The former are obtained from corporations, organizations, public officials, etc., and include such matters as

² See article on plant sociology in the *SCIENTIFIC MONTHLY* (4: 456-460) for May, 1917.

aggregate and per capita wealth; manufacturing, banking and insurance; railway mileage, number of newspapers, telephones, automobiles, libraries, etc., per capita or per square mile; church membership, school attendance, pauperism and crime.³ Individual statistics are based on inquiries made of or about all individuals (or at least all adults, voters, or heads of families), and may include, among other things, number of persons per unit area, distance of residence from birthplace, age, marital condition, education, and occupation. (Wealth and church membership could indeed be ascertained from individuals, but our census has never been so inquisitorial.) The statistics of agriculture occupy an intermediate position, for the average farm is commonly a one-family institution.

Almost any of the kinds of institutional statistics could be used as a rough measure of civilization, but different kinds might conceivably give quite divergent results. Some very significant data about the civilization of rural districts can be obtained from agricultural statistics, such as the value of farm buildings, the proportion of farm land that is cultivated, the value of crops per acre, etc., but that tells us nothing about conditions in cities, and need not be considered further at present.

Some of the individual statistics, such as those of age and marital condition, do not vary much with the progress of civilization, while others, like illiteracy, give us only one average (or as many averages as there are groups used), without telling how far any individuals depart from that average. If, however, we have criteria in which each individual is given a rating, and the number of persons between any two points on the scale is known, we can look at the matter in a two-dimensional way and construct characteristic curves for each community or group. The census has long been giving us information of this sort about the ages of the population, but as just stated that is of little or no service in measuring civilization, the age curves for all sufficiently large populations being very similar.

The two most promising criteria for making civilization curves seem to be education and occupation; but unfortunately the treatment of these in our censuses hitherto has not been very satisfactory. About the only inquiry on existing census schedules about the education of the adult individual is whether or not he can read and write. It would seem perfectly feasible and very desirable for the census demographers to recognize

³ It has been suggested, though perhaps not altogether seriously, by some chemists that the amount of soap or of sulphuric acid used by a nation is a pretty good measure of its civilization.

several grades of education instead of only two, separating those who have been through high school or college from those who have not, and so on, or simply to ascertain how many years of schooling each person has had. If errors were made by the enumerators they would balance to a considerable extent in the final summing up, and even if many individuals remained wholly unclassified as to education, significant ratios could still be worked out from the returns for the others. The results of such an inquiry could of course be further segregated according to race, sex, and age, like the present illiteracy data, or restricted to adults if desirable.

As far as occupation is concerned, recent censuses classify workers minutely enough by industries, but not very satisfactorily by grades of work, so that one would have trouble in determining from the returns the number of idlers, unskilled and skilled laborers, clerks, foremen, proprietors, etc., in a given community. There should be no special difficulty, however, in preparing schedules that in addition to classifying the workers by industries as heretofore would put each individual into a certain grade. If we fix the number of grades at ten for convenience they might be divided as follows:

0. Persons who are a burden to society, such as criminals, imbeciles, mendicants, vagrants, and paupers.

1. Unemployed but harmless persons, such as children, students, invalids, gentlemen of leisure, and aged people.

2. Unskilled laborers, who work mostly in gangs, under more or less constant supervision, with a minimum of responsibility.

3. Here may be put three fairly distinct groups, which are of approximately equal rank, but could be separated if more than ten grades were used. First, men who require no more education than the unskilled laborers, but have more responsibility, and work much of the time alone, and thus have opportunity to cultivate their powers of observation and develop resourcefulness. *E.g.*, woodsmen, fishermen, farm hands, miners, cowboys, teamsters, boatmen, trainmen. Second, semi-skilled laborers, who require usually a few weeks to become proficient in their work, such as factory operatives, motormen, chauffeurs, locomotive firemen, and house-painters. Third, persons who have some responsibility, financial or otherwise, but little or no authority other than that involved in keeping order or guarding property, and do not need much education. Examples are clerks of various kinds, agents, salesmen, small merchants, policemen, city firemen, soldiers, and janitors.

4. Skilled laborers, who have learned a trade by a period of

apprenticeship, or by a few months of study. Some of the less obvious examples are stenographers, bookkeepers, telegraphers, locomotive engineers, pilots, musicians, cooks, interpreters, printers, sign-painters, and photographers.

5. Persons in authority, having some executive ability, but not requiring any originality or higher education, and not elected by the people. *E.g.*, foremen, managers, chief clerks, sea-captains, manufacturers, contractors, bankers, capitalists, and proprietors of hotels, large stores, plantations, etc.

6. Professional men and experts, mostly college graduates, who have qualified for their work by a special course of study lasting a year or more; such as lawyers, architects, civil engineers, foresters, chemists, and physicians. Many if not most of these do not work on a salary basis, but get their remuneration irregularly from a large number of clients or patients.

7. Altruistic public servants, who work for several or many people simultaneously, and influence them for good at little or no cost to each individual benefited. To this class belong most if not all educators (perhaps excluding young teachers of limited experience who are not making that their life work), clergymen, missionaries, journalists, lecturers, and philanthropists. In education they rank about equally with those in class 6, but their ideals are usually higher, and their remuneration less in proportion to the value of their services than in any of the preceding classes.

8. Public officials and statesmen, elected by the people, or holding high appointive positions, like judges, ambassadors, commissioners, and cabinet members. Perhaps presidents of colleges, railroads, large corporations, etc., and elected officers of nation-wide organizations, should be included in this class, and officials of small communities, who have some other business that takes up most of their time, excluded.

9. Persons whose chief occupation is adding to the sum of human knowledge, or writing or doing things that have not been said or done before,⁴ such as investigators, explorers, inventors, scientists, poets, novelists, humorists, cartoonists, composers, artists, "empire builders," and perhaps even holders of world records in athletics. It is on this small class, constituting (in the United States something like one ten-thousandth of the total population, that the progress of civilization mainly depends.

⁴ New ideas, methods or principles should be the test rather than mere new facts, otherwise newspaper correspondents, detectives, crop reporters, census enumerators, tax assessors, surveyors, etc., would have to be put in this class. But almost every one who habitually writes books or magazine articles (other than mere hack-writers) or composes music or poetry or turns out inventions or works of art belongs here.

There will doubtless be some difference of opinion as to the relative rank of some of the occupation classes just outlined, but in a general way those in the higher classes have the most education and the widest spheres of influence, and are fewest in number, as will be shown by some of the curves selected for illustration farther on.⁵ As a rule persons in any one of the grades have passed through some or most of the grades below it before attaining their present positions; but this is not a strict linear sequence like the educational grades, for classes 0, 4, 6 and 8 are more often side branches with no outlet than stepping-stones to something higher. Or to put it in another way, many persons reach groups 5, 7 and 9 without passing through those immediately below.

Of course it is impossible to draw sharp lines between the different occupation groups, on account of the endless variety of occupations in our complex civilization,⁶ and also because there are at all times large numbers of persons in a state of transition from one group to a higher one. But such difficulties are inherent in almost all classifications, and need not be regarded as insurmountable. (Very similar difficulties are encountered, for example, in defining the zones of vegetation on the slopes of a high mountain; and in the case of a complex mountain system, with a considerable variety of soil and exposure conditions, it may not always be certain which of two non-contiguous zones is the higher.)

To apply the criteria here proposed to the measurement of civilization, let us suppose that each individual in the community and group under consideration (be it total population or only adults, natives, whites, males, or some other restricted group) has been given a decimal rating in education and occupation.⁷ The sum or average of the two might be called his civilization number or coefficient. A curve could then be con-

⁵ The results of a psychological rating for United States soldiers taken from a number of different occupations in civil life, published in *Science* for March 14, 1919 (page 358), agree pretty well as far as they go with the sequence here adopted. Even the Russian Bolsheviks are reported to have grouped the workers of that country a few months ago into about thirty categories in ascending order, with fixed salaries for each, ranging from 370 rubles per month for apprentices and beginners to 2,200 for certain public officials. Their classification, as published in some of our daily papers, bears some resemblance to the one here proposed (which was worked out in nearly its present form in the summer of 1917, but not published until now). Confucius is said to have divided the workers of China into four grades over two thousand years ago.

⁶ The last United States census recognized about 17,000 different occupations for purposes of enumeration, and assembled them in 428 groups in the published returns.

structed having for its ordinates the civilization numbers, and for its abscissas the number or percentage of persons ranking at and above any given number. With a decimal rating in two different lines we would of course have instead of a curve a series of twenty steps of the same height and varying width, but if the number of grades were increased the steps would approach more nearly to a smooth curve, steepest among the higher grades, like a similarly constructed curve for the ages or wealth of the population, cities or farms arranged in order

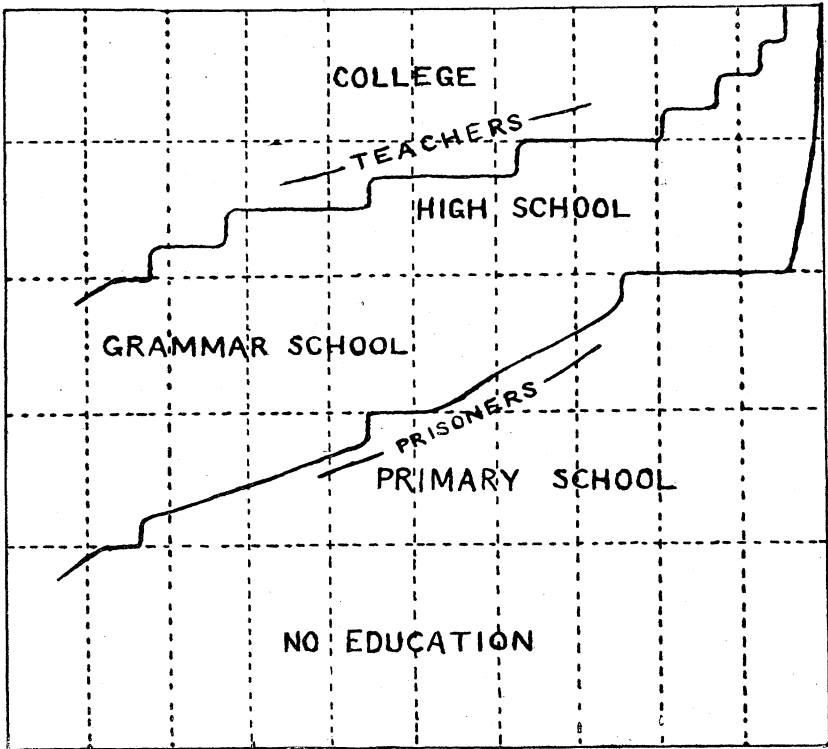


FIG. 1. EDUCATION CURVES FOR 3,648 ALABAMA TEACHERS AND 2,500 INDIANA PRISONERS, BASED ON 1919 STATISTICS.

of size, species of trees in a forest in order of abundance, and many other things easily called to mind.

To illustrate the workings of the system two graphs are presented. As there seem to be as yet no available data giving both education and occupation simultaneously for any considerable portion of the population, the two kinds of ratings are treated separately.

⁷ If it were possible to add psychological tests to the educational and occupational inquiries here proposed we might have a still more satisfactory measure of civilization.

In both graphs horizontal distances represent percentages, and the vertical lines divide the figures into ten equal parts to facilitate measurement. On any horizontal line the distance from the point where a given curve intersects it to the right-hand edge of the figure represents the percentage of the total number who rank above that point, and *vice versa*. The average rank of any curve is of course proportional to the area between it and the base. Nearly all the persons on which these curves are based are adults; but if the total population of any normal community were graded in this way the large number of children would probably make the uneducated and unemployed classes the largest.

The first graph rates according to education two groups far apart in the social scale, namely, 3,648 rural and village teachers (including both white and colored) in Alabama, and 2,500 inmates of the Indiana State Prison. The figures for teachers are taken from Bulletin 41, 1919 series, of the U. S. Bureau of Education, and those for prisoners are from a newspaper abstract, published last spring, of an article by Dr. Paul E. Bowers of the institution named.⁸

Vertical distances in the education graph represent the amount of schooling, on the assumption that a normal individual who goes through college enters school at the age of six and spends four years in each of the four divisions indicated, graduating at twenty-two. Each curve in this case represents a single occupation group (number 7 in one case and 0 in the other), so that if education and occupation were being rated simultaneously the curves would still be of the same shape, but farther apart.

⁸ Very likely some additional data of this kind could be found, but these are all that have come to the writer's notice recently. There are some educational statistics in "Who's Who in America," but they give only two or three points on the educational curve, and about half the persons listed in that work are college graduates, not further classified as to education.

If we could construct an education curve for the whole adult population of the United States it would doubtless lie between the two shown in Fig. 1. As pointed out above, the census gives us only one point on such a curve, namely, the percentage of illiterates. In 1910 the illiteracy percentage for adult males of all races and nativities was 8.4 in the whole United States (24.3 in Alabama and 4.1 in Indiana). The number of college graduates for the whole country—but not for single states—can be estimated approximately from the table of colleges in the New York World Almanac. From that it appears (after making due allowance for omissions) that there are something like a million living college graduates in the United States, which is about 1 per cent. of the total population or 2 per cent. of the adult population. Or if the sexes were separated it would probably be found that about 3 percent. of the men in this country are college graduates.

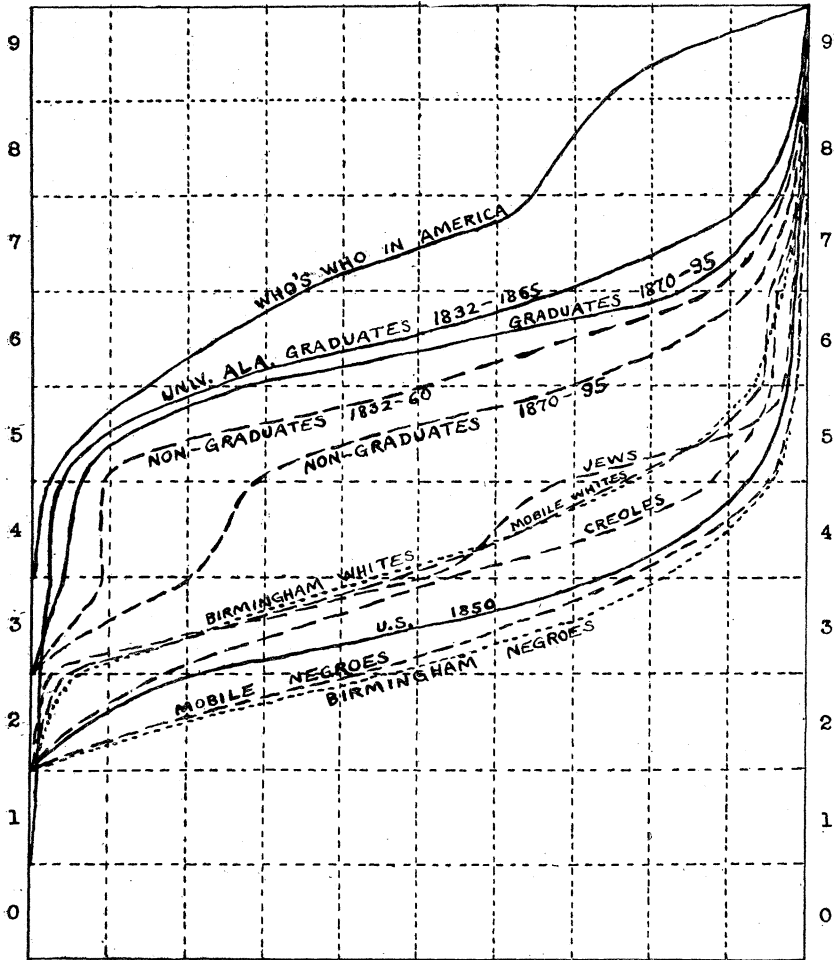


FIG. 2. OCCUPATION CURVES FOR THE FOLLOWING TWELVE GROUPS.

1. First 1,000 names in "Who's Who in America," 1916 edition, excluding a few cases difficult to classify.
2. 373 graduates of the University of Alabama, 1832-1865.
3. 674 graduates of the University of Alabama, 1870-1895.
4. 586 non-graduates of same, 1832-1860.
5. 1005 non-graduates of same, 1870-1895.
6. 959 white persons in Birmingham, Ala., whose names begin with A. (1913.)
7. 527 negroes in Birmingham, Ala., whose names begin with A.
(The Birmingham curves are dotted lines.)
8. 564 white persons (including Jews and Creoles) in Mobile, Ala., selected from first part of alphabet.
9. 281 supposed Jews in Mobile.
10. 156 Creoles in Mobile.
11. 749 negroes in Mobile, selected from first part of alphabet.
12. 5,307,347 free males over fifteen years old, gainfully employed in the United States, 1850.

The numbers at the sides correspond with the occupational groups defined in the text.

The second graph is based on occupation only, and includes twelve different curves. The vertical distances correspond with the ten occupational grades above outlined, and are numbered accordingly. For the sake of simplicity it is assumed that each step on the occupational ladder is of the same height, there being apparently no rational method of determining how much they should differ, if any.⁹ And for the sake of appearances all the curves are drawn as smoothly as possible, on the assumption that no two persons are of exactly the same rank, and that there are all gradations between the highest and the lowest. For any one curve the number of persons in any occupational group is measured by the horizontal distance between the points where it cuts the upper and lower boundaries of the group; so that gentle slopes indicate large numbers and *vice versa*.

The uppermost curve in this graph is based on the first thousand names in the 1916 edition of "Who's Who in America," and probably does not differ noticeably from that which might be derived from the last thousand or any other large number in the same work. It would have been comparatively easy to construct separate curves for men and women, married and single persons, natives and foreigners, persons with German, Jewish, Irish or Scandinavian names, different age groups, residents or natives of different states, or of cities and rural districts, and those with different religious or political affiliations (where such are indicated), but that would have taken considerable time and complicated the graph too much.

The next four curves are based on graduates of the University of Alabama, and matriculates who did not graduate, both living and dead, in two different periods of approximately equal length, before and after the Civil War. The data are taken from an alumni catalogue published in 1901. Those whose occupations were unknown to the compilers of the catalogue, or who died before embarking on their life work, have been left out of the calculations, so that practically none falls in the unemployed class except a few retired business men.

The higher rank in civilization of graduates as compared with non-graduates is just what one would expect, and illustrates graphically the effect of higher education. The higher

⁹ It is possible, however, that it would be nearer the truth to make the upper steps wider, for there seems to be greater diversity of ability among the higher classes than among the lower. For example, one unskilled laborer is about as good as another, which can not be said of managers, teachers, or scientists. And it is easy to prove by means of statistics of illiteracy, farm building values, etc., that in those parts of the United States having a large colored population there is more variation among the whites than among the negroes, even where the latter are decidedly in the majority.

rank of the ante-bellum students, both graduates and non-graduates, may be due to more than one cause, but the principal one is doubtless that at the time the record was made, in 1901, many of the students of 1870 to 1895, especially the later ones, had not reached as high a station in life as they did later. This is borne out by the comparatively large number of public officials among the ante-bellum graduates—for one does not usually get elected to public office until middle life—and by the number of post-bellum non-graduates still in the clerk and book-keeper classes in 1901.

The continuous curve below the middle of the graph is for all white and free colored males over fifteen years old in the United States returned by the Seventh Census as having gainful occupations in 1850; they are 5,371,876 in number, from which however have been deducted 64,529 that are hard to classify. That census recognized 325 different occupations, most of them designated by only one or two words, and all arranged in an alphabetical list with the number of workers assigned to each. (Similar data were also given for each state.) With occupations so briefly characterized it is often difficult to determine the proper rating, and it is pretty certain that two or three different grades are sometimes combined under a single word, such as agents, dealers, farmers, jewelers, lumbermen. But the errors of judgment tend to balance each other to a considerable extent when so many are involved, and the resulting curve harmonizes very well with others near it. Similar curves could be constructed for separate states and later censuses, thus affording opportunities for some interesting comparisons.

The remaining six curves are derived from the 1913 directories of Birmingham and Mobile, Alabama, both published by the same company.¹⁰ In order to make these curves comparable

¹⁰ R. L. Polk & Co., of Columbus, Ohio. A city directory usually lists about a third of the total population, mostly adult males. Wives are not mentioned at all in the Mobile directory, but in that for Birmingham their existence is indicated by their first names in parentheses following the husband's names (in the case of the white population; among the negroes the married men are indicated by a special symbol, but the wives' names are not given). In both directories the occupation, if any, of each person listed is given in a word or two (usually abbreviated), and even less explicitly than in the 1850 census above mentioned, so that there is room for many errors of judgment; these, however, must neutralize each other to a large extent in the final summation. Persons whose occupations are not given seem to be mostly widows keeping house for their children, and young ladies not employed outside their homes.

The criminal class of course does not figure as such in these directories (or in census enumerations), because some of them have unmentionable occupations, some have no fixed habitation and thus escape enumeration, and some are confined in penal institutions.

with others the unemployed persons are disregarded, for there is no sure way of distinguishing between the busy housekeepers on the one hand and the debutantes, society women and superannuated people on the other.

The Birmingham directory puts all names in a single alphabetical list, designating negroes by a star before the name. The Mobile directory lists the two races separately, and in the list of whites uses a special symbol for the Creoles, who constitute a little more than 1 per cent. of the whites or about $\frac{3}{4}$ of 1 per cent. of the total population (but have never been distinguished in census reports). The curves for whites and negroes in both cities as presented here are based on only a few hundred names at the beginning of the alphabet, but the results are probably accurate enough for present purposes.

For Mobile there are given here two additional curves, one for Jews and one for Creoles. The number of Jews in this or any other American directory can not be estimated very accurately, but they were identified as far as possible by their names, all the way through the alphabet.¹¹ And even if a large number were overlooked in the count that should make no particular difference in the occupation percentages. The count of Creoles aimed at completeness. The whole number of them found in the directory was less than 200, and eliminating those whose occupations were not given left only 156, rather a small number for accurate results, but the curve lies between those for whites and negroes in the same city, as we should expect. The curve for Jews also fulfills expectations in being strong in proprietors and clerks, and weak in skilled and unskilled laborers and public officials.

The contrast between whites and negroes in the proportion of unskilled laborers is very marked, as would be expected. Of course none of the college men or celebrities are in that class at all. One would have hardly expected so much similarity between the curves for the ancient seaport of Mobile and the modern manufacturing city of Birmingham, scarcely forty years old. The fact that the different curves do not cross each other much is rather significant.

A city directory naturally gives no direct information about the educational equipment of individuals, but even if it did and that had been utilized in constructing these curves—as should be done whenever it becomes possible—it probably would not change their shape much, for persons in the higher occupations commonly have the most education, as already stated.

¹¹ By this means it was estimated that Jews constitute about 2 per cent. of the white population or a little more than 1 per cent. of the total population of Mobile.

It is interesting to note that if the space for class 2 in the occupation graph were bisected by a horizontal line that would cut each curve at a point corresponding approximately to the illiteracy percentage of the group represented thereby;¹² which would harmonize very well with an assumption that half the unskilled laborers but very few of those belonging to the higher classes are illiterate.

Although the occupation data have been compiled rather hurriedly, without any attempt at extreme accuracy, the curves serve very well to illustrate the differences between several diverse population groups in a new way, and to demonstrate the validity of occupation as a test of civilization. If we had such curves for many different countries the knowledge should be extremely valuable for many purposes. For example, it would shed new light on the question of which nations are fitted for a popular government and which should remain monarchies or dependencies for some time to come. For a country or community with not more than half of its adult male population above the rank of unskilled laborers—a condition approximated by the two lowest curves, and probably also by Liberia, Haiti, Mexico, and several other tropical countries—could not be expected to govern itself very well if all the men had an equal voice in public affairs.

Some such point of view would have been useful in this country about two years ago, when large numbers of men were being classified for military service. Many of those shown by psychological tests or otherwise to be too low in intelligence were excused,¹³ but little or no allowance was made for the few at the other extreme, men of higher grade than the lawmakers and military authorities (and therefore presumably too valuable for military service), except in the case of those above the age limit and a few special easily defined classes like clergymen and public officials.¹⁴

At various times in the last century or two, particularly in Russia since 1917, and in this country since the close of the recent world war, groups of men in occupation classes 2 to 4 (who are naturally not well grounded in the fundamentals of economics and sociology) have sought to divert by one means

¹² There are of course no illiterates among the "Who's Who" people and college men, and probably very few among the Jews, in the South at least. The illiteracy percentage for white and free colored persons over twenty in the United States in 1850 was given by that census as 10.35. That for adult males in 1910 in Birmingham was 2.3 for whites and 23.0 for negroes, and in Mobile 1.1 for whites and 25.1 for negroes.

¹³ See *Science*, II., 49: 53-61, 221-226, 251-259, 1919.

¹⁴ See B. E. Livingston, *Science*, II., 49: 202, 203, February 28, 1919.

or another to their own use some or all of the share of the profits of industry that rightfully belongs to the small minority of "bourgeoisie" who supply the brains or the capital, on the theory that those who work with their hands should have all the proceeds of their labor, and that mere numbers should dominate irrespective of ability, and regardless of how much inconvenience or injustice to innocent parties results from their selfish demands. Such attempts are rarely completely successful, however, for the obvious reason that civilization without competent leadership (classes 5 and upward) is impossible.¹⁵

When census methods become sufficiently refined so that civilization can be studied graphically in some such way as that here proposed for a long period of years, it will probably be found that the average rating of any one community, unless it is small enough to be affected materially by immigration and emigration, changes very slowly; although conceivably the shape of its characteristic curve might fluctuate locally or temporarily in response to educational and child-labor legislation or other influences. Although we seem to have made phenomenal progress in some lines in recent decades, it is chiefly in the sum total of human knowledge—that can be stored up and disseminated by means of the printing press, which did not exist a few centuries ago—rather than in individual efficiency.¹⁶

Some caution should be used in making comparisons by this method between different countries, or even different sections of a large country like ours, for it might not be fair to measure such different types of civilization as American and Japanese, or Yankee and Southern, by the same standards, at least until some more refined system is devised. But persons who have the time and inclination can easily give the plan a further trial with various city directories, alumni catalogues, biographical dictionaries, etc., without waiting for the census to take it up; and very likely many improvements can be suggested.

¹⁵ If it was at all practicable it would be an interesting experiment to turn over to these insatiable toilers (some of whom have long been earning more than brain-workers who have far more education and experience and could make much better use of the money if they had it) for a time a few mines, newspapers, factories, railroads or islands, and see how long they could run them successfully without foremen, proprietors, experts, teachers, editors, lawmakers, inventors, writers, etc. Very likely sooner or later men would arise from the ranks of the laborers to fill these higher positions, but if so conditions would then be essentially the same as before the beginning of the experiment.

¹⁶ In this connection see the abstract in *Current Opinion* (67: 106–107), for August, 1919, of a newspaper article by Dr. Charles Gray Shaw on knowledge as the cause of inefficiency.